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IMPACTS OF AND RESPONSES TO DROUGHT IN AFRICA
AN OVERVIEW

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IMPACTS OF AND RESPONSES TO DROUGHT IN AFRICA: AN OVERVIEW

I. INTRODUCTION

1. Over the last decade there have been several spells of severe drought conditions in Africa which have caused widespread suffering in nearly 70% of the countries. Following the last severe spell of 1982-1983, governments of Africa at the ECA Conference of Ministers decided to intensify their activities to combat the social and economic impacts of drought by encouraging more operational research in this area of natural calamities. The idea was to come out with practical measure to mitigate the impacts on the social and economic systems in Africa. Hence the ECA Conference of Ministers at its eighteenth session, by resolution 473 (XVIII), called on the Scientific Community, international agencies and the member governments of the region to urgently organize a Scientific Round Table to examine the situation and propose practical measures to alleviate the problem.

2. Pursuant to the recommendation of resolution 473 (XVIII), a series of inter-agency meetings were held to prepare for the Scientific Round Table. The idea was to have a feed-back from the agencies to sumbit to the Round Table for discussion. This paper is an update of the agency contribution to the first and second preparatory meetings sponsored by the World Meteorological Organization, Geneva, 5 to 8 October 1983 and by the United Nations Environment Programme (UNEP) in Nairobi 12 to 16 December 1983. The paper raises issues on the direct impact of drought human responses to drought and proposes a framework of a plan of action to mitigate its impacts.

II. DIRECT IMPACT OF DROUGHT ON AFRICAN SOCIAL AND ECONOMIC SYSTEMS

3. Working on the definition of drought as a deficit in rainfall to the level where this triggers off shortages in those economic goods whose production and distribution depends on precipitation, it would be possible to identify sectors of social and economic systems that have been shaken by severe spells of drought. By definition, therefore, drought will have direct impact on water resources and aquatic life, agricultural production and those income generating activities that depend on rainfall as well as the overall ecological balance.

4. Climatic variability and drought have been a known phenomenon in Africa for a long time. However, the very severe spells of these early 1980s particularly in those countries bordering the Sahara and Kalahari deserts further highlighted the seriousness of this problem which has plagued the countries of the region for decades. The governments of the region suddenly realised that these dry climatic conditions and drought were threatening, more than ever before, the social and economic resource capabilities on which their governments and political structures rest.

Impact on economic systems

5. The areas of economic production that are directly hit by prolonged rainfall deficit below water needs are agriculture, hydro-electric power and those sectors that depend on this source of energy.

Agriculture 1/

6. Food and agriculture in Africa have deteriorated over the last two decades. The recent 1982-1983 drought, which is continuing into 1984, has further worsened the food situation in many countries of the region, where population growth has steadily increased from 2.05% in the mid-fifties to nearly 2.8% presently. For Africa a whole, per caput food production fell throughout the 1970s. Even before the present food shortages, the average person in Africa had less access to food than ten years ago. This explains why, to meet the shortages, which are now being aggravated by drought, food imports continued to increase.

7. The impact of the present spell of drought that began in 1982, and the further worsening of food crisis, are being felt in many more countries in Africa than before. The drought brought to the limelight the fact that not only the Sudano-Sahelian countries were affected but that the Kalahari desert region was under stress.

8. Evidence from the Sahel and the Kalahari subregions is unanimous in revealing how greatly shaken the agricultural structures have been resulting in reducing food production.2/ In Botswana, there has been great variability in the quantity of agricultural production and maize and sorghum production fell to 9,900 tons from the 1969 figure of 42,600 tons, despite a slight

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1/ Apart from other sources, the sections that follow is based on inter-agency contributions to the preparatory meetings for the Scientific Round Table.

2/ D.B. Jones (1977): "Drought and Arabic Farming". Botswana Drought Symposium (Clark University Press, Massachusettes).

increase in the area under cultivation. The situation worsened during the period 1976-77 when the arable area was reduced from 401,000 hectares to 233,000 hectares bringing crop production from 118,227 tons (1976) to 68,428 tons 3/ (1977). The situation in Mauritania is another clear example, where

> "after a satisfactory growing season in 1981-82 during which Mauritania produced 70,000 tons of divers grains, 49,400 tons of meat and 2,500 tons of milk, the dearth of rainfall during the 1982 hivernage has provoked widespread desolation .... . Low rainfall throughout West Africa meant that the annual flood of the Senegal River ..... was the lowest since 1972-73, a particularly parched year, (resulting) in a sharp drop in the amount of land planted in flooded depressions: from 37,000 hectares in 1981-82 to only 12,000 hectares this year (1983) ..... . In these conditions famine is a spectre haunting Mauritania, as well as several other Sahelian countries especially Mali and Chad."4/

9. A similar situation was reported in Ethiopia where, due to late and deficient rains, the main season crop failed in the north and over 200,000 of the more than three million people are supposed to have died from starvation 5/ particularly in the regions of Eriteria, Tigrai, Wollo and Gondar. Drought conditions have prevailed in these regions and recent food short-falls, especially in the Wollo region, have been in excess of 150,000 metric tons compared with the 1980-81 period. 6/ Mozambique has also been hard hit and is

> "suffering its worst drought on record. Market stalls in the capital, Maputo, are empty and in the country side people are making do with roots and leaves after two dry years. This year (1983) virtually no crops have grown". 7/

3/ D. Dalby & R.J. Harrison Church (ed.) (1973): Drought in Africa" Report on the 1973 Symposium (Centre for African Studies, S.O.A.S. University of London)

4/ West Africa (21 Feb., 1983, "Drought Strikes again in Mauritania") pp. 457-459

5/ Geoffrey Lean (1983): "Three Disaster hit Africa" in Africa Now, October 1983.

6/ UNDRO (Dec., 1983): Drought Situation in Northern Ethiopia: Report of the inter-agency mission, 29 September to 8 October 1983 (UNDRO, Geneva).

7/ Geoffrey Lean, Ibid. p. 120

10. Even the Ivory Coast, lying on the fringes of the equatorial climate has had unfavourable agricultural production due to a serious deficit of rain as a result of exceptionally long and strong harmattan winds, and uncontrolled bush fires. 8/

11. On the whole, the countries of the Southern African Development Co-ordination Conference (SADCC) comprising Angola, Botswana, Lesotho, Malawi, Mozambique, Swaziland, Zambia and Zimbabwe, received less than 50% of the normal rainfall in 1982 a situation which added to the widespread food shortage. 9/ So, also in the Sahel

> "1983 looks like being just as disasterous as 1973. Drought is again affecting the entire region, including countries further south that were less badly hit before. The 10-year cycle has come again, only more severely". 10/

12. The consequences of food shortages have been mass famine, malnutrition, disease and death.

Livestock farming

13. In most of the African countries that are exprienein drought, earnings from livestock are crucial to the economy and to the welfare of the population. After two successive droughts in these countries, large numbers of animals died and many that survived were too weak to be productive.

14. To aggravate the situation, the livestock support that gives social and economic standing in those societies, that are predominantly pastoral, is devastatingly reduced by 60 to 70% in certain cases 11/, although cattle can stand prolonged periods of drought if their "minimum requirements for food and water are met either consistently or frequently". 12/

15. In Mozambique alone, an estimated 100,000 cattle have died as a result of lack of grazing pastures and water, while a further 1,500 are dying every month. In the Central African Republic, over 2,000 livestock were lost and apart from the high mortality of livestock the majority of the herds were at a high risk from the rinderpest disease.

8/ Africa Research Bullitin, Vol, 20, No. 7, July 15 - August 14, 1983 pp. 6937-8

9/ Ian Leslie-Smith (1983): "Drought: Africa's nightmare" in AED 21 October 1983, pp. 2-3

10/ AED, Ibid. p. 5

11/ West Africa Magazine, 21 February, 1983

12/ J.H. Topps (1977): "Adaptation of cattle to drought conditions and their requirements for food and water" in Drought in Africa No. 2 (IA - 1 - London)

16. Drought resistance is fairly restricted to the cattle between the ages of one year and four years, as Dahl and Hjort 13/have demonstrated in this table indicating cattle mortality rates (%) with age.

Age	Severe drought	Less severe drought
0 - 1	90	50
1 - 4	40	20
4 - 8	60	40
8 - 13	90	60
- 13	100	100

Herd fertility is also affected and calving rates drop even to zero during severe drought periods, although a resurgence to 90% during the favourable year following the drought is possible before stabilizing to the normal 70% thereafter. 14/.

Energy and industry

17. Water deficits resulting from drought end up in a reduced volume and eventual drying up of streams, rivers and dams for hydro-electric projects. When this happens, hydro-electric power can no longer be generated for domestic and industrial use. Industrial production is paralysed. Scarce resources are drafted to support services rather than income generating ones. For example, in Botswana,

> "$20 million is needed to develop the Ramotswa well-head to supply Gaborone and Lobatse, where water shortages have already cut industrial production. The field will supplement Gaborone dam which could dry up by December unless heavy rains fall early in the season.15/

18. This situation explains why most of these countries depend on thermal sources for electric power despite the fact that, under normal circumstances, Africa is highly endowed with the potential for hydro-electric power.

13/ Dahl and Hjort (1979): op.cit. p. 15

14/ Ibid., p. 15

15/ Ian Leslie-Smith (1983), Ibid., pp. 2-3

Available data is strongly suggestive of the close relationship between development of hydro-eelecticity, industrial development and the service sector which determine the level of economic performance.16/

General socio-economic impacts

19. The economic impacts of diminishing production in the agricultural and other sectors are well known to be, among others, an increase in the cost of living and a decrease in the income from agriculture and livestock raising.17/ This puts a serious stress on peasant incomes and livelihood. When this is further complicated by drought conditions and consequent desertification, the situation becomes embarrassingly untenable.

20. Drought and desertification lead to the drastic reduction in the area of arable land. This means that, even if the labour were there, there is no land to cultivate. Rural unemployment and rural exodus are the result. The urban centres cannot also offer employment to most of them as the secondary and tertiary sectors of the economy are also not developed to cope with this influx. Agro-industries are also seriously affected as they no longer have the raw material resource base to function profitably.

21. The debilitating economic effects on the labour force in the countries affected by drought are lamentable. Starvation, famine, malnutrition, disease and the increased death rate have dramatically reduced the quantity and quality of the labour available for all the sectors of the economy. The resources of the health and welfare services are under stress to cope with these areas of relief and rehabilitation. In short, scarce national resources are being diverted into famine relief operations and despite international help, the situation is deteriorating. The cyclical effects are low incomes, poverty, lack of capital for investment, low production, under-development.

22. The following figures, Table 1, represent a general situation in the majority of the countries that are now suffering the impacts of drought. 18/ The situation has been worsening. Levels of inflation have been soaring higher and higher and the economic growth rate has been either zero or negative. The population growth rate, in most cases, has been more than 2.5%, while the index of food production per capita has been decreasing. There is, therefore a general situation of economic regression.

16/ E/CN.14/LDCs.1/2 Part I and II: Survey of economic and social conditions in Africa, 1979-1980 (ECA, Addis Ababa)

17/ See Section A above and documents E/CN.14/802 Parts A and B.

18/ World Bank: World Development Report, August 1981, pp. 134-5.

	Population in millions (mid-1979)	Area ($000 km^2$)	Average annual growth rate % 1960 - 1979	Average annual rate of inflation (%) 1960-70	1970-79	Average index of food production per capita (1969-71) - 100 1977-79
1. Algeria	18.2	2,382	2.4	2.3	13.3	75
2. Benin	3.4	113	0.6	1.9	9.2	97
3. Chad	4.1	1,284	-1.4	4.6	7.9	91
4. Ethiopia	30.9	1,222	1.3	2.1	4.3	84
5. Ghana	11.3	239	-0.8	7.6	32.4	82
6. Guinea	5.3	246	0.3	1.5	4.4	96
7. Kenya	15.3	583	2.7	1.5	11.1	92
8. Mali	5.8	1,240	1.1	5.0	10.0	88
9. Mauritania	1.6	1,031	1.9	1.6	10.1	75
10. Morocco	19.5	447	2.6	3.0	7.3	93
11. Niger	5.2	1,267	01.3	3.1	10.3	89
12. Nigeria	82.6	924	3.7	2.6	10.0	97
13. Senegal	5.5	197	-0.2	1.7	7.6	88
14. Somalia	3.8	630	-0.5	4.5	11.3	85
15. Uganda	12.8	230	-0.2	3.0	28.3	90
16. United Rep. of Tanzania	18.0	945	2.3	1.8	13.0	94
17. Upper Volta	5.6	274	0.3	1.3	9.8	93
18. Zambia	5.6	753	0.8	7.6	6.8	99

Table 1: Economic indicators of some of the countries affected by drought

23. Since the agricultural sector is the principal one that contributes the greatest share of the GDP and is the main source of employment and income generation, severe drought often dooms the rate of growth of the GDP and per capita income. It will also reduce the level of personal incomes and exacerbate the problem of rural unemployment and under-employment.

24. The adverse economic effect has been reflected in the balance of difficits, which for the Sudano-Sahelian countries rose from US$683 million in 1977 to US$3,477 million in 1980.19/

25. Under these circumstances, the easy flow of goods and services between countries and general economic co-operation should be the rule if the less depressed areas can come to the assistance of the more depressed. But, this has often been the exception 20/

Social impacts

26. The social impacts of deficient agricultural production and poor economic performance can be very far reaching and devastating. The rural African family and traditional social structures are built around the agricultural production system. In rural communities subsistence is the main purpose of agricultural production. Consequently in these traditional societies, like the African countries that are not stricken by drought, the cohesion of family and lineage structure is mostly determined by the stability of the agricultural system, including animal husbandry and pastoralism. The culture of the people is also built around this production system. The whole concept of existence - birth, growth, maturity (initiation), death, medicine and medical care is based on it. Rituals and rites related to all these elements of life and those that have to do with the weather and its seasonality, climate and its variability, are all based on the biotic and ecological support capabilities of the given environment.

27. Drought is firstly a natural phenomenon, but social responses and poor land use practices greatly amplify its impacts. In fact, it has been strongly suggested, basing on a review of the situation in the Sahel over the last century, that "drought may be the consequence of the breakdown of traditional, social and economic practices"21/ and, is true of the rest of Africa, particularly after the colonial era.22/ "Colonialism introduced a drastic change to the

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19/ Leonard Berry (1983): Assessment of Desertification in the Sudano-Sahelian Region, 1977-1983 (Clark University and UNSO, forthcoming).

20/ [illegible] (1977) "Trends in Land-Land Interaction in the West African Sahel" in Drought in Africa 2 (International African Institutes, Africa Environment Special Report No. 5, London)

21/ [illegible] (1977) "Some Sociological Aspect of Drought" in [illegible] (Clark University Press, Massachusetts).

22/ D.H. Jones (1977): Drought and Arable Farming. Ibid. p. 225

system in which cultural groups had hitherto evolved to have "a symbiotic relationship with other groups" as well as with the methods of traditional environmental management in these harsh zones.23/ The areas that have been hard hit by this colonial system have been those of arable farming systems and pastoralism.

28. Although little work has been done specifically on the problems of demographic dynamics in the Sahelian and other areas with similar conditions in Africa,24/ the impact of severe drought on population morbidity, and general population movement is considerable. Data on human mortality due to direct climatic drought is usually difficult to ascertain although the monitoring of deaths resulting from increased malnutrition is possible. Not much data exists on case of susceptibility to the risk of death from diseases which might not be fatal under normal circumstances. Caldwell (1975) has suggested the explanation for the relatively low mortality in these conditions as being the

> "age-old methods of adaptation: the eating of plants known to have food value but little used in good years, the killing of wild animals eventhough these have diminished in number markedly during the present century, the eating of one's own animals, and the movement to better places".25/

29. Population mobility as a result of the pressures arising from the impact of climatic variability and drought has been one of the crucial problems to handle. This mobility has not respected national boundaries and has been more within the context of geographical regions than political frontiers.

30. In most areas in the Sahel and the Kalahari desert regions the history of population migration has been linked with the occurance of severe bouts of droughts, as Webster (1977) has indicated in the case of Malawi whose littoral region provided a region of refugee for drought victims even from outside Malawi.26/ Boutrais (1977) recounts a similar situation in the plateau region of Cameroon which provides ambiant grazing areas for the herds.27/ Caldwell (1975) has documented the situation where the 1970-74 drought produced large-scale population movement of Tuaregs and Fulanis arriving in Nigeria and neighbouring countries from as far as Mali.28/

23/ J.C. Caldwell (1975): The Sahelian Drought and its Demographic Consequences. (Overseas Liaison Committee, American Council on Education).

24/ J.C. Caldwell, Ibid. p. 27

25/ J.B. Webster (1977) "Drought & Migration" The Lake Malawi Littoral as a Region of Refugee" in Symposium on Drought in Botswana, op. cit, pp. 148-157

26/ Jean Boutrais (1977) "Une consequence de la secheresse? Les migrations d'Elevenos vers les plateaux Camerounais" in Drought in Africa, No. 2, op. cit. pp. 127-139

27/ J.C. Caldwell (1977), op. cit., pp. 27-29

28/ Caldwell, op. cit.

31. Most of the movement during recent drought years has been from rural areas to urban centres both within national frontiers and outside them. The other focii of population movement has been to refugee camps in order to have subsistence in the form of international relief provisions.29/ The movement to cities is explained by

> "The exacerbation of drought ..... is likely to further accelerate the disaggregation of the pastoral society and place the mass harratine in an even more delicate position. A large number have also drifted to the towns in search of employment or joined the armed forces. The activist ..... movement(s) or urban-based education harratine has been pushing the government for holder reforms ..... . Nevertheless, the persistence of drought in Mauritania has touched off the dynamics of social change".30/

32. This is a representation of a general situation which is not only true of the pastoralist societies of the arid and semi-arid regions, but also of the sedantry farmers communities of both the Sahel and the Kalahari desert regions.

33. When the family, the society and the cultural ensemble can no longer exist as before, supporting themselves on the resources its environment was endowed with, it begins to breakdown. Migration at all levels increases, people begin to fend for themselves and not support other family members or their community.31/ The African principle of the interdependence of the members of the family, society and the community can no longer function. The community as basis for most development activities in most traditional societies ceases to function and economic production is hampered.

III. RESPONSES TO THE IMPACT OF CLIMATIC VARIABILITY AND DROUGHT

34. To alleviate the serious impact of severe drought, there have been traditional responses to these conditions.32/ In a nutshell, these responses have been in the area of land and water resource management as well as those aspects of the conservation of the ecology and the general environment that would cope with the social and economic impacts of drought and desertification.

29/ West Africa Magazine, op. cit., p. 459

30/ West Africa Magazine, op. cit., p. 459

31/ J.B. Webster (1977): op. cit.

32/ R.K. Hitchcock (1977): "The Traditional Responses to Drought in Botswana" in Symposium on Drought in Botswana, op. cit.

35. The amount of water available for domestic, agricultural and industrial uses is determined by the amount of precipitation in a given place during a given period of time. Drought or conditions where rainfall for a given place over given periods is persistently below normal, results from a situation where the amount of precipitation is less than the amount of water lost by evaporation. Underground water resources in these zones might appear to provide one of the solutions, but the exploitation is hampered by inadequate financial, manpower and technical resources.

36. The problem of water management would, therefore, appear to be that of the effort aimed at reducing the mount of evaporation and increase the amount taken in and maintained by the soils for agricultural production. Irrigation, the main agricultural water management technique in these zones has been the practice.

37. The dynamism of the ecosystem and the exuberance of its life-support capacity will influence the ease with which the human population inhabits it.

38. In African societies much of socio-cultural and socio-economic institutions are built on the ecological environment and particularly the vegetal life. Specific vegetal species are used in traditional medicinal practices, rites and rituals, lineage and genealogy, chronology and economic transactions. Apart from the degradation of the physical environment - soil erosion and so on, the destruction of the vegetal cover contributes to destroying the history and culture of people and the destabilisation of social and cultural institutions on which most African politico-administrative systems are built.

39. A degraded ecology and environment directly affect activities in all the sectors of the economy, such as, reduced agricultural production both for food and cash crops; problems of industrial location due to the depletion of support resources of raw materials (agro- and forest industries) and quality of labour force due to migration; stress on the service sector as communications might be rendered difficult as it becomes more difficult to raise financial resources or community labour to maintain lines of communications in usable state.

40. It can be seen from the above sketch that droughts, particularly those of the dimensions of the 1970-74 and 1982-83, exert devastating constraints on the fragile African economies. The seriousness of the situation will be understood when it is noted that over 95 per cent of the countries affected are among the least developed even by African standards. Even with resource inputs from international humanitarian assistance and services to the drought stricken groups, only a very small minority is reached due to the fact that the political and administrative structure are not organized and managed in a manner that the service infrastructure can facilitate the flow of these inputs, no matter how small, to trickle down to the affected masses.

41. In the face of the aforegoing, therefore, two levels of responses can be identified: adaptative responses and non-adaptative responses. Adaptative responses here refer to in situ reactions to drought spells within the same or usual habitat of the victim while non-adaptative responses refer to the situation where the victim decides to leave the usual habitat, temporarily or permanently. Kgathi and Opschoos (1981) have documented examples of these two

situations as they apply to Botswana which would be illustrative of the universal in the African context.23/

43. The first adaptative response in the face of drought is the effort to cope with the shortages in basic subsistence economic goods, particularly food. The common in situ adaptative response is where

> "People ..... commonly respond to the primary effects of drought by selling cattle, seeking employment, and by resorting to food sharing. In the event of an arable drought, the wealthier people depend on sale of cattle as buffers against the impact of drought in order to raise money for purchasing food when drought prolongs and increase in severity, the buffering effects of cattle sales becomes less significant since the condition of cattle starts to deteriorate making them less marketable."24/

43. Non-adaptative responses are those by which the victims of drought leave the local environment. This results in all levels of population movement, rural-rural migration, rural exodus to urban centres in search of alternative employment and long-distance nomadism. The majority of the drought affected population of Africa tend to resort to this situation because of the lack of resources and management skills for adaptative measures to be taken.

IV. RESEARCHABLE AREAS FOR POSSIBLE STRATEGIES TO MITIGATE THE IMPACTS OF DROUGHT ON THE SOCIAL AND ECONOMIC SYSTEMS IN AFRICA

44. In looking at climate and drought within the context of Resolution 473(XXIII), the concern has been to provide possible strategies for handling social and economic problems resulting from prolonged spells of drought conditions in the African region. The concerted action of the collaborating agencies for this Scientific Round Table was meant to avoid the duplication of some of the programmes to combat the impact of drought and desertification now being carried out by organizations like UNSO, FAO, UNESCO and UNEP (UNSOD).

23/ D.L. Ngathi and J.D. Opschoor (1981): Drought impacts and adaptations: Socio-economic aspects of the 1979 Ngatleng Drought (National Institute of Development and cultural research notes No. 4, University College of Botswana, Gaborone).

24/ Ngathi and Opschoor, Ibid. p. 40

45. any programmes geared towards improving methods of land husbandry and improve food production as well as stop the advance of the desert are being carried out by these agencies. However, the main problem is the lack of profound understanding of the fundamental issues that provoke or enhance adaptation, these issues which should be used as basis for data collection. As Caldwell (1975) clearly pointes out, this has been because of the absence of an infrastructure at national level to collect systematic data.35/ The problem is further complicated by the situation where most governments, while soliciting food aid, still come out with incorrect data showing favourable increase in food production or do not provide any data to support the request.

46. To attempt answers to the concerns raised by resolution 473 (XVIII), researchable areas for data/information collection and analysis of the social and economic impact of drought would include:

(a) national weather and micro-climatic types and variability;

(b) drought and native vegetal species, their behaviour and possible adaptation of exotic ones to specific local micro-climatic conditions;

(c) human responses and socio-cultural adaptations to drastic dry climatic changes such as local techniques;

(d) economic activity and severe climatic variability;

(e) development of early warning systems, methods of effective awareness campaigns and,

(f) modalities of multinational co-operation and manpower training.

47. It is important to stress here that for any strategies to be effective they must be generated at the level of the capabilities of national governments by regulating those activities that have had an incipient environmental protection component build into it. Vierich and Sheppert (1980) have summarised an administrative framework for the short, medium and long terms which are worth taking note of in planning drought impact control related activities.36/

35/ Caldwell (1975) op. cit.

36/ Helga Vierich and Christopher Sheppard (1980): Drought in Rural Botswana: Socio-economic impacts and government policy (Rural Sociology Unit, Ministry of Agriculture, Gaborone).

48. Short-term measures would involve a drought monitoring system and the mobilization of drought relief while medium and long-term administrative measures would be concerned with recovery and drought proofing.

49. Drought recovery would cover measures live providing free seeds after drought and subsidization during normal years as well as drought power subsidization in the form of communal mechanised animal drought pools, reserve grazing or fodder banks and limitation on oxen sales.

50. Drought proofing would involve stocking and restocking loans to aid rural poor in improving and maintaining their access to revenue generating resources.37/

51. Within this framework a programme of activities for self-reliance within the aims of the Lagos Plan of Action can be initiated. The effort should be to reduce technical or relief aid to the lowest minimum because excessive aid kills local initiatives and perpetuates sometimes unnecessary dependence. Consequently information on the areas mentioned above as possible researchable areas should be amasses and techniques diffused, particularly to African countries that are contiguous.

(a) Drought, national weather and climatic types and variability: their social and economic implications

52. Although much is known about global, regional and subregional types of climate within which countries fall, very little work has been done on micro-climatic variations, particularly in Africa. Studies of micro-climatic changes and variability would require an ellaborate data collection infrastructures and variables like daily precipitation, winds, insolation, temperatures, and humidity. These variables greatly influence the rhythm and dynamism of social and economic activities in traditional societies, particularly during periods of drought. Besides, the local meteorological services and organs of the World Meteorological Organization (WMO), educational and similar institutions should also be used for climatic as well as social and economic data collection. Every primary school, secondary school and university should have a weather observatory to collect the types of data mentioned above. The department of geography at national universities would carry out analysis of such data and in collaboration with the national meteorological service should be able to provide information on which precautionary programmes can be set up.

53. The issues there would appear to the resources and the modalities for setting up such a network and making it work effeciently. How could WMO, National meteorological and climatological services use local, social and economic institutions for collection data and in collaboration with FAO, plan an information diffusion system that would help farmers and those in allied industries to plan their production activities in a manner to cope with the severe conditions?

37/ Vierich and Sheppard (1980) op. cit.

54. Inter-agency activities could help national governments in enhancing such programmes as suggested above.28/ ECA's social and economic surveys should include some of the current information at national level. However, the fundamental question would be that of the agencies developing practicable modalities of collaborating with national governments in developing or enhancing such a data/information collection infrastructure.

(b) Drought and native vegetal species

55. Vegetal species that are not adapted to their environment will not stand severe climatic stress for a long time. Within the framework of the social and economic impacts of the variability of climatic conditions and drought at national level, discussed above, what is the feasibility of collecting data to determine the critical survival points? Are there woodland management techniques that could develop resistant species from native ones? What exotic species including economic ones, can be introduced and what would be the modalities of introducing them within the physical as well as socio-cultural environments involved? How can ECA, UNEP, FAO, UNSO and UNESCO collaborate with national governments to find possible practical responses to these questions, if they are relevant, with regards to specific micro-climatic conditions.

(c) Human responses and socio-cultural adaptability

56. It was stated above that the human population has a remarkable ability to adapt to different climatic types, but how much is known about the observed and recorded information on the adaptability to critical and severe variations within each climatic type? It would be useful to develop, maintian and update a data/information, bank on questions such as:

(i) What are local traditional practices and human responses to severe climatic variability?

(ii) If some of these practices alleviate the impact of such climatic variability, how do the agencies concerned, national governments and related institutions collaborate in enhancing them?

(iii) Is it necessary to introduce new/exotic practices, what is the potential of popular acceptability in the short and long run? What would be the impact on the socio-cultural and socio-economic environments?

57. When these types of information are gathered, what would be the modalities that ECA, UNEP, UNESCO, UNSO, FAO, and other agencies could adopt to enhance the acceptability of these changes in local practices that will alleviate the impact of climatic conditions that result in drought and increase the risk of desertification in the area concerned?

28/ Elizabeth Mily: R.O.R. Mealkone, J. Treyeles (1977): Symposium on Drought in Botswana, op. cit. pp. 208-220

(d) Economic activity in drought conditions

58. The approach in evaluating the impact of drought on economic activity and the overall economic development would be to monitor production patterns, particularly at micro-level. There might be some corelation between the varying family income levels and the rythm of the drought cycles. It will definitely be useful if governments develop machineries for keeping cost-of-living indices which could be compared with agricultural production and other related data.

(e) Early warning systems

59. Using the data/information gathered as suggested in (a), (b) and (c) above, FAO, WMO, who have been working with meteorological satellites like METEOSAT, and UNSO could come out with an early warning system developed,39/ or enhanced where they exist, for African countries within the context of resolution 473 (XVIII). The crucial issue here is how the agencies can mobilize resources to develop and effectively maintain such a system for this purpose.

(f) Manpower training

60. For the activities in the researchable areas, for information gathering and dissemination, mentioned above to be fruitfully carried out, a corpus of climatic variability and drought data/information collection personnel must be developed to handle the functioning of any infrastructure that could be set up. This corpus would include daily weather condition technicians, rural sociologists and support manpower drawn from local grass-root institutions and economists specialized in peasant production systems under such conditions with support data/information collecting from local sources.

(g) Multidisciplinary research on farming systems

61. Broad-based multidisciplinary research programmes on the effects of climate on agricultural practices and on food production are indicating that traditional systems of cultivation have a high capacity for withstanding climatic variations such as drought, over the agricultural systems of the more developed countries, now being propagated throughout Africa. The latter systems are energy-intensive requiring a lot of machanization and chemical inputs. They also have a high degree of homogenity such as mono-species and mono-varietal cultivation which are generally associated with a narrow range of adaptability to fluctuations of water availability.

39/ E. Hily (1977): Ibid. pp. 208-209

62. Traditional systems of cultivation such as mixed croping, agro-forestry and animal husbandry have a great potential for improvement. Hence, a drastic re-appraisal of agricultural research priorities and extension methods in Africa is required in order to understand the adaptability of local farming and livestock systems to climatic variability. Interdisciplinary research on traditional systems of cultivation requires close interaction between the scientists and the local farmers and pastoralists in order to survey the store of vernacular knowledge available to the community. To this end, it is expected that the international community would support the efforts of African governments to carry out the medium and long-term activities.

63. The collaborating agencies should think of ways and means of finding the resources and institutional infrastructure to do this.

V. FRAMEWORK OF A PROGRAMME OF ACTION

64. Resolution 473 (XVIII) implicity requests the development of a programme of action in the short-, medium- and long-terms for remedial measures to alleviate the impact of all aspects of drought. This programme of action would be a follow-up to the Scientific Round Table Conference. The programme of action may be within the context of data/information collection and dissemination, the development of an early warning system and manpower, capability training so that new ideas on how to mitigate the social and economic impacts of drought can be diffused.

(i) Short-term activities

(a) Data Collection and dissemination

65. The first activity here would be to identify national and multi-national focii that could be used for climatic and related social and economic data/information collection and dissemination as well as a detailed inventory made of them. These would include:

(i) national meteorological and climatological service infrastructure;

(ii) educational institutions;

(iii) national farmers co-operative or other similar institutions;

(iv) agricultural stations and related extension service posts;

(v) other institutions whose activities depend on weather/climatic conditions;

(vi) national data processing facilities.

For any firm action, the existing institutional resources have to be known.

(b) Development of an early warning system

66. Since this activity might depend, to a large extent, on the data to be gathered, the existing institutions should be sensitized as to the possibilities of the application of such a tool.

(c) Manpower training and institutional capability development

67. Manpower availability and existing areas of needs should be identified and a national directory, of possible, maintained of them. National institutions specialized in arid and related land management training should be identified.

(ii) Medium-term activities

(a) Data collection and dissemination

68. A timetable should be set for data processing and dissemination and roles allocated for national governments, multinational and international agencies.

(b) Early warning systems

69. A medium-term evaluation programme should be laid down and programmed into the activities of all parties concerned.

(iii)(c) Manpower training and institutional capability development

70. A programme of institutional strengthening should be agreed upon and an evaluation programme for the effectiveness of output initiated. Workshops should be held as refresher courses.

(iii) Long-term activities

71. Tools of measurement and a long-term programme of evaluation should be set up for re-assessing methods of data collection and dissemination, the functioning of any early warning system that might be developed and the needs for manpower and institutional capability development.

VI. CONCLUSION

72. The above areas of discussion could guide deliberations at the Scientific Round Table to come out with possible answers and programmed action for Africa within the context of ECA Resolution 473 (XVIII), namely:

(a) causes of the present dry climatic and resultant drought situation;

(b) periodicity of these climatic variabilities and drought in order to understand the cyclical behaviour and the significance in their differences;

(c) effects of drought on the African economy; and

(d) remedial measures that can be taken in the short-, medium- and long-terms to deal with the situation.

73. Unless the African national governments affected re-organize, their priorities and their planning systems to mitigate the social and economic impacts of drought, external aid or relief would not help much.